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Agriculture and Food Security in Northeast Nigeria: Challenges, Prospects, and Policy Implications

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ABSTRACT

Agriculture is often regarded as one of Nigeria's most important food security industries, particularly in the northeast. However, the region has faced significant challenges in recent years, impacting both agricultural production and food security. This article examines the relationship between agriculture and food security in Northeast Nigeria, focusing on the key factors that influence agricultural productivity and its impact on regional food security. The study utilises a qualitative and analytical approach, relying on secondary material such as government records, scholarly publications, and reports from international organisations. It investigates how insecurity, climate change, environmental degradation, farmer and farmland displacement, inadequate infrastructure, and limited access to modern agricultural inputs have all harmed farming activities and food production in the region. The ongoing insurgency has impacted agricultural practices, particularly in the Northeast, by diminishing crop fields, destroying rural livelihoods, and displacing agricultural workers. According to the findings, low agricultural output is one of the causes contributing to increased food insecurity, malnutrition, and poverty among the region's rural families. Despite several government and humanitarian efforts to boost agricultural production and food security, considerable obstacles remain. The report highlights the importance of sustainable farming practices, greater security, modern farming methods, and rural infrastructure development in Northeast Nigeria for improving food production and long-term food security. According to the research, agriculture must be promoted in order to solve food insecurity and improve regional socioeconomic stability.

1. INTRODUCTION

Agriculture is critical to the sustainability of livelihoods and food security in Northeast Nigeria. The region, which encompasses Borno,

Yobe, and Adamawa, is primarily reliant on agriculture as the main source of income and nutrition for rural households. Smallholder farmers account for the majority of agricultural production, growing staple crops such as millet,

sorghum, and cowpea, as well as cash crops like groundnuts and sesame, which contribute to household income and regional food markets. Despite its importance in the region, agriculture has faced considerable disruptions in recent years as a result of conflict, climate change, and socioeconomic issues.

Long-term instability is a major factor influencing agricultural production and food security in Northeast Nigeria. The Boko Haram-linked insurgency has decimated rural communities and agricultural systems. Over a decade of conflict has displaced millions of people, destroyed agricultural infrastructure, and limited farmers' access to fields and local markets.

Many communities have been forced to abandon their farms due to insecurity, resulting in major losses in agricultural productivity and rural income. According to the World Bank [1], the conflict's economic impact on agriculture and other industries in Northeast Nigeria is expected to exceed \$1 billion. As a result, the region continues to face severe food insecurity, with over 3.7 million people experiencing acute food scarcity [2].

In addition to violence, climate change and environmental degradation have reduced agricultural productivity in the region. Northeast Nigeria is located in a semi-arid ecological zone that is particularly susceptible to climate variability. In recent decades, the region has seen unpredictable rainfall patterns, protracted dry seasons, and numerous droughts, all of which have harmed crop output and livestock husbandry. These climate changes interrupt traditional farming cycles and increase the vulnerability of smallholder farmers who rely heavily on rain-fed crops [3]. Desertification has also increased in many sections of the region, resulting in soil degradation, lower agricultural output, and less pasture land for cattle.

Extreme weather events, notably floods, are

becoming more common and destructive in Northeast Nigeria. Heavy rainfall in recent years has resulted in widespread flooding, submerging vast areas of farmland, destroying crops, and damaging agricultural infrastructure such as irrigation systems, roads, and storage sites. These environmental shocks not only diminish agricultural output but also increase post-harvest losses and disrupt food supply chains, all of which contribute to rising food costs in local markets. As a result, many farming households face seasonal food shortages, particularly during the lean season, when food reserves from past harvests are exhausted [2].

The combination of warfare, climate instability, and economic hardship has worsened food insecurity in Northeast Nigeria. During the lean season, many households struggle to meet their daily food needs and frequently turn to coping techniques such as restricting the number of meals consumed, eating fewer desirable things, or selling household assets to purchase vital commodities. These methods may provide short relief, but they typically exacerbate long-term vulnerability and poverty [2].

In response to these issues, a number of projects have been launched to boost agricultural productivity and resilience in rural communities. The Food and Agriculture Organization's programs aim to strengthen food systems by promoting integrated agricultural practices, boosting crop output, and fostering livelihood diversification through activities like fish farming and small-scale agribusiness. These programs aim to assist rural households in recovering from conflict-related disruptions and adjusting to changing environmental conditions. Despite these efforts, the humanitarian situation in the region remains unstable due to ongoing unrest and climate shocks.

Given agriculture's critical role in supporting livelihoods in North East Nigeria, a thorough understanding of the region's agricultural

productivity and food security concerns is required. Addressing these concerns necessitates integrated methods that include conflict resolution, climate-resilient agricultural practices, enhanced rural infrastructure, and stronger institutional support for small-scale farmers. Such initiatives are critical for improving food systems, increasing rural resilience, and supporting sustainable agricultural growth in North East Nigeria.

1.2. Statement of the Problem

Food security is a major socioeconomic concern in Nigeria, particularly in the Northeast. The Northeast geopolitical region, which includes states such as Borno, Yobe, Adamawa, Bauchi, Gombe, and Taraba, has long relied on agriculture as its primary source of income and food supply. Crop cultivation, animal husbandry, and fishing are among the agricultural activities that contribute to food supply and income generation in rural areas.

However, in recent years, there have been serious interruptions in the agricultural sector, which has had a significant influence on food production and distribution. One of the primary reasons for this is the long-running Boko Haram insurgency, which has displaced millions of people, destroyed farmlands, and limited farmers' access to agricultural resources [4,5]. Insecurity has caused a substantial number of farming families to quit their farms, resulting in low agricultural output and increased dependency on humanitarian food aid [6,7].

In addition to insecurity, climate change, desertification, flooding, poor infrastructure, and a lack of access to new farming methods, among other factors, have all contributed to the regions. All of these challenges have contributed to increased food insecurity, malnutrition, and poverty among rural families in North East Nigeria [8,9].

Despite several government and international intervention programs aimed at improving food yield and security in the region, food insecurity persists. This raises important concerns about the soundness of agricultural policy, the vulnerability of local agricultural systems, and the sustainability of food production in the region.

As a result, the purpose of this article is to investigate the relationship between food security and agriculture in Nigeria's Northeast region, specifically the difficulties influencing food production and the actions that must be implemented to promote long-term food security in the area. This results in widespread food insecurity and malnutrition in North East Nigeria [10,11].

1.3. Aim and Objectives of the Study

This project will examine the relationship between agriculture and food security in Nigeria's Northeast, with the goal of understanding how agricultural productivity, challenges, and policies affect food availability, accessibility, and sustainability in the region. The specific objectives are as follows;

1. To investigate the significance of agriculture in maintaining food security in Northeast Nigeria.
2. To identify the primary problems to agricultural production and food security in Nigeria north-eastern region.
3. To analyse how insecurity, climate change, and socioeconomic factors affect agricultural output and food supply in Northeast Nigeria.
4. To assess the tactics and government initiatives used to improve agricultural production and food security in Northeast Nigeria.

1.4. Research Questions

- i) How does agriculture contribute to food security in Northeast Nigeria?
- ii) What are the biggest difficulties to agricultural output and food security in Nigeria's north-east region?
- iii) How do insecurity, climate change, and socioeconomic factors influence agricultural output and food availability in north-east Nigeria?
- iv) What strategies and government initiatives can boost agricultural productivity and food security in Northeast Nigeria?

2. LITERATURE REVIEW

2.1. Insecurity and Food Production in the Northeast

Years of conflict in Northeast Nigeria have disrupted food production, leaving approximately 3.7 million people in the BAY states (Borno, Adamawa, and Yobe) in desperate need. The insurgency has triggered extensive migration, cut off access to farmland, and disrupted local agriculture, resulting in acute famine for millions, particularly children. "Right now, we face severe food shortages," says Modu Umar, a Dikwa community leader, adding that some families have to travel long distances every day to collect firewood to sell in order to buy food. "Farming is the only solution to hunger." Farmers' movements are severely restricted in some communities due to instability. "Some people trek three hours to reach their farms," says Gajibo farmer Churi Ibrahim, 70. "By the time you arrive at your farm, you're already exhausted, and when you get home, it's late." Despite these challenges, farmers persevere. "Even when you're afraid, you have to go," says

Bintu Konto, a mother of five. "If you don't farm during the rainy season, you'll have nothing to eat."

In Nigeria, the threat of instability looms large, casting doubt on the country's ability to maintain food security. This essay dives into the complex web of issues presented by insecurity, analysing how it impedes agricultural activities, displaces populations, erodes infrastructure, causes economic strains, and eventually, leads to a rising humanitarian disaster.

The widespread instability in Nigeria undermines the fundamental fabric of daily life, especially in rural areas where agriculture is a lifeline. Farmers, who are vital to the country's food production, are caught in the crossfire of violence, leaving their crops unmanaged and unproductive. The widespread fear of violence drives many people to abandon their fields, resulting in a decrease in crop cultivation and harvest, exacerbating the danger to food security. The impact of insecurity extends beyond the fields, affecting vital infrastructure necessary for agricultural output transportation and distribution. Roads and transportation networks, which are frequently targeted in acts of violence, deteriorate under the weight of insecurity, limiting farmers' capacity to convey their crops to markets. The resulting supply chain disruptions contribute to higher food costs and lower consumer affordability, exacerbating the situation.

Economic insecurity has an indelible impact on Nigeria's food security environment. A weakening agricultural industry means fewer job prospects and income for farmers, continuing the cycle of poverty. The economic effect extends beyond agriculture, affecting numerous industries that contribute to total food supply and cost, exacerbating the country's woes.

According to Dunn [12] the Boko Haram insurgency in Northeast Nigeria has had a major impact on child health outcomes due to

disruptions in social services and increased food insecurity. Similarly, Kah [13] examines the ongoing issue of food insecurity in particular regions of Nigeria and Cameroon, which has been aggravated by the presence of the Boko Haram insurgency. Since its inception in 2009, this insurgency has not only ruined entire towns, but it has also destroyed food crops, killed cattle, and forced farmers to flee to protected camps.

Food instability causes malnutrition, especially in children under the age of five and pregnant or lactating women. In response, the International Committee of the Red Cross funds malnutrition stabilisation facilities and community education to assist families in caring for vulnerable children.

To address these concerns and build long-term resilience, the International Committee of the Red Cross has created an agricultural assistance program that promotes both rainy and dry season farming. This year, more than 21,000 farming households got seeds adapted to local conditions, as well as seed planting tools to minimize labour costs and increase efficiency. The support includes both field crops and vegetables, such as rice, maize, tomato, and okra, which help to promote dietary diversity and nutrition. Farmers are also taught sustainable farming practices, which helps to build local capacity and guarantees they can continue after the ICRC departs.

On a larger scale, and in conjunction with the National Agricultural Seed Council (NASC), the ICRC recently repaired a key water supply, ensuring continuous water access for the council's seed testing and greenhouse facilities. Nonetheless, the lean season is a significant challenge for many farmers who are unable to provide adequate food for their families. "For a large family like mine, we don't always get one meal a day," says farmer Churi Ibrahim [14].

2.2. The Impact of Climate Change on Agricultural Production

Rising temperatures, unpredictable rainfall, and rapid desertification have disturbed agriculture in Northeast Nigeria, causing a 20-30% drop in grain crop yield. The shrinking of Lake Chad, shorter growing seasons, and greater droughts have all had a negative impact on maize, sorghum, and millet yields, worsening food shortages and farmer-herder conflict.

Pests and diseases evolve in tandem with the climate. Areas that were previously unaffected by particular crop-eating insects, severe blights, or fungi may now be exposed to new, unknown threats. "The net effect of these climates (-induced) impacts will generally be negative (e.g., droughts causing reduced crop yields or crop failures), though they may be positive in some instances (e.g., warmer springs, longer growing seasons)," according to an Oxfam report [15]

Agriculture has historically played a pivotal role in Nigeria's economic development, serving as the backbone of the economy and providing livelihoods for a significant proportion of the population. The sector contributes approximately 23–25% of Nigeria's Gross Domestic Product (GDP) and employs over 60% of the workforce, the majority of whom are engaged in smallholder and subsistence farming [16,17].

Beyond its economic contributions, agriculture is central to food security and serves as a stabilising force in rural communities. Northern Nigeria, in particular, functions as a major agricultural hub, producing staple crops such as millet, sorghum, maize, and groundnuts, alongside extensive livestock production [18,19].

Agriculture in Northern Nigeria remains vital for sustaining livelihoods and ensuring food security for millions. However, the sector is increasingly

vulnerable due to the intensifying impacts of climate change. This vulnerability is pronounced because most agricultural activities in the region depend heavily on rain-fed farming systems, which are highly sensitive to fluctuations in rainfall patterns [20,21]. Unlike irrigated systems, rain-fed agriculture has limited adaptive capacity to climatic variability, leaving farmers exposed to unpredictable weather conditions. Consequently, even minor climatic variations can significantly affect agricultural productivity, posing serious risks to the socio-economic well-being of rural populations [22].

One of the most critical manifestations of climate change in Northern Nigeria is the steady rise in temperature. Empirical studies indicate that average temperatures in the region are increasing at a concerning rate, with projections suggesting further rises in the coming decades [23,24].

Higher temperatures cause heat stress in crops and cattle, deplete soil moisture, and increase the incidence of pests and illnesses, all of which impair agricultural productivity. Crops such as maize and sorghum, which are regional staples, have exhibited diminishing yields when exposed to extended heat stress [25]. In addition to rising temperatures, irregular rainfall patterns pose a significant challenge for farmers in northern Nigeria. Historically, the region's rainfall was very constant, allowing farmers to plan their planting and harvesting schedules. However, climate change has disturbed natural cycles, causing scant and inconsistent rainfall. Droughts have been caused by prolonged dry spells during important growth seasons, but flooding, soil erosion, and waterlogging have also caused crop damage [26].

These variable weather patterns hinder farmers' ability to maximise productivity, pushing many to use unsustainable practices such as over-

cultivating marginal crops. Desertification is another severe consequence of climate change that threatens agriculture in Northern Nigeria. The region already features semi-arid and arid conditions, and the Sahara Desert's spread has increased due to reduced vegetation cover, overgrazing, and unsustainable farming practices. According to the United Nations Convention to Combat Desertification (UNCCD), desertification affects more than 35% of Nigeria's total land area, with Northern Nigeria bearing the brunt of the degradation. The loss of fertile soil has reduced crop and pasture availability, limiting agricultural output and putting farmers and herders' livelihoods at risk.

Extreme weather events, such as storms and flash floods, are becoming more common in Northern Nigeria as the climate changes. These disasters destroy farmlands, animals, and infrastructure, putting farmers in a perpetual state of repair. For example, the devastating floods of 2012 and 2022 caused significant agricultural losses in Nigeria, with Northern states being particularly hard hit [27]. Such disasters not only reduce current food supplies, but also jeopardise long-term agricultural development by depleting resources and discouraging investment in agriculture. The combined effects of these climate-related factors endanger the profitability of agriculture in Northern Nigeria.

With millions of people reliant on agriculture for a living, decreased production has far-reaching implications for food security, poverty alleviation, and economic development. Addressing these challenges necessitates quick action to boost the agriculture business and ensuring that rural communities can adapt to changing climates. Climate change's impact on agriculture in Northern Nigeria is more than just poorer food production; it also includes broader socioeconomic vulnerability.

As agricultural output declines due to climate-

related issues such as drought, unpredictable rainfall, and desertification, rural people face increased poverty and food insecurity. Because the region relies heavily on agriculture for a living, even minor disruptions can have far-reaching consequences for household incomes and broader economic stability [25]. This is particularly concerning in a region where poverty rates are already high, and food production is critical to ensuring economic and social stability.

Climate change poses significant risks to agricultural productivity beyond crop production, affecting livestock systems and the broader agricultural economy. In Africa, livestock play a crucial role in farmers' livelihoods, serving as sources of income, food, and essential animal products [28,29]. Climate change impacts livestock both directly and indirectly [30]. Direct effects arise from changes in climatic variables such as temperature, humidity, and wind speed, which influence animal growth, milk yield, wool production, and reproductive performance [29]. Indirect effects include alterations in the availability and quality of feed resources—such as pasture, hay, and grains—as well as changes in the prevalence and distribution of livestock diseases and parasites [31].

Addressing the impacts of climate change requires a comprehensive assessment of agricultural productivity across all subsectors. In Nigeria, rainfall remains the most critical determinant of climate variability and water resource availability [32,33]. Furthermore, the northeastern region of the country is increasingly experiencing desertification, largely due to declining surface water, vegetation loss, and depletion of animal resources [34,35].

Rural-to-urban migration often results in overcrowded urban centres, rising unemployment, and increased pressure on urban infrastructure [36,37]. In addition, migration and

environmental stress can intensify competition over scarce resources, leading to conflicts between farmers and herders, thereby further destabilising affected regions [38,39]. For instance, climate-induced resource scarcity has been linked to a rise in herder–farmer conflicts in Nigeria's Middle Belt [40]. Northern Nigeria's vulnerability to climate-induced shocks is exacerbated by its semi-arid climate and limited adaptive capacity. The region lacks the necessary infrastructure, financial resources, and institutional frameworks to successfully mitigate climate change [25]. This limited competence not only stymies efforts to build resilience, but also reduces local communities' ability to recover from climate-related shocks.

Agroforestry, conservation agriculture, and integrated pest control are all examples of sustainable agricultural practices that can boost productivity while also safeguarding the environment.

This study aims to contribute to the growing conversation by looking into how climate change affects agricultural output in Northern Nigeria. It analyzes the socioeconomic consequences of climate-related problems and evaluates possible mitigation strategies to address them. The study is particularly timely, considering Nigeria's reliance on agriculture as a key driver of economic development, as well as its relevance in ensuring food security for the country's growing population. Understanding the link between climate change and agricultural sustainability in Northern Nigeria is critical for establishing policies that might increase resilience, promote rural development, and preserve farmers' livelihoods in the face of increasing climatic uncertainty.

3. THEORETICAL FRAMEWORK

3.1. Food Security Theory

This study is based on Food Security Theory, which describes the conditions in which individuals and communities have consistent and reliable access to sufficient, safe, and nutritious food for an active and healthy life. The notion attracted global attention during the World Food Conference and has subsequently been expanded upon by the Food and Agriculture Organization [25]. Food security, according to the FAO, is a condition in which all people have physical, social, and economic access to adequate food that fits their dietary needs and food choices, allowing them to live an active and healthy life.

Food Security Theory is built around four pillars: availability, access, utilisation, and stability. Food availability refers to the consistent and adequate production and supply of food from agricultural and other sources. Food access refers to an individual's or household's ability to receive food through income, markets, or social support systems. Food utilisation refers to the proper biological use of food, which is supported by adequate nutrition, clean water, healthcare, and sanitation. Finally, food stability highlights the consistency and continuity of food access throughout time, ensuring that shocks such as conflict, climate change, or economic crises do not disrupt availability, access, or utilisation [41,42,43].

This hypothesis is pertinent to the current study since agricultural productivity is a key factor influencing food supply and livelihoods in Northeast Nigeria. However, interruptions such as insecurity, farmer displacement, and environmental problems reduce agricultural production, aggravating food insecurity in the region. Applying Food Security Theory provides a complete understanding of how these factors affect each of the four pillars and contribute to

long-term food insecurity.

3.2. Relevant to the Study

Food Security Theory is significant in the study of agriculture and food security in Northeast Nigeria because it explains how disruptions in agricultural production caused by insecurity, natural impediments, and economic restraints affect food supply and access in the region. When farmers are forced to leave their property due to violence or climate-related factors, agricultural output falls, resulting in a diminished food supply and greater food insecurity. Thus, the theory provides a useful framework for investigating how Northeast Nigeria's food security might be improved by increasing agricultural production, improving rural livelihoods, and addressing insecurity.

3.3. Findings

The study's findings are presented in response to the research concerns that prompted the examination into agriculture and food security in northeast Nigeria.

3.3.1. The Role of Agriculture in Food Security

The study concludes that agriculture is critical to ensuring food security in northeast Nigeria. The great majority of people rely on agriculture for food, jobs, and income. Maize, millet, sorghum, rice, and beans are widely farmed, providing the majority of the region's household food supply. Agriculture thus contributes significantly to food security while also benefiting rural populations. However, the sector remains predominantly subsistence-based, with a number of constraints limiting productivity.

3.3.2. What are the Major Challenges Facing Agriculture in the Northeast, Nigeria?

Agriculture in Northeast Nigeria faces serious challenges in 2025-2026, mostly due to chronic insecurity (Boko Haram/bandits), which displaces farmers and abandons farmland. Other key challenges include strong climate shocks (floods and droughts), high input prices (fuel and fertiliser), limited mechanisation, and substantial post-harvest losses.

Agriculture today faces a convergence of critical challenges, primarily driven by climate change—extreme weather, drought, and pests. Farmers are under pressure to produce more food for a growing population while managing limited resources such as water and land. Key challenges include rising operational expenses, labour shortages, and regulatory impediments.

The findings show that agricultural productivity in Northeast Nigeria is hampered by a number of difficulties. These include limited access to modern agricultural inputs such as improved seeds, fertilisers, and mechanised equipment. Poor rural infrastructure, notably roads and storage facilities, increases post-harvest losses and restricts market access. Furthermore, many small-scale farmers do not have access to loans or agricultural extension services, which limits their capacity to implement new farming techniques and enhance output.

3.3.3. Effects of Insecurity, Climate Change, and Socioeconomic Factors

The study also found that instability, climate change, and socioeconomic difficulties all have a substantial impact on the region's agricultural output and food supply. Boko Haram's war has displaced many farmers and restricted access to farmland, lowering agricultural productivity. Climate-related factors such as irregular rainfall,

drought, and flooding diminish crop productivity. Furthermore, poverty, a lack of education, and limited access to agricultural training make it difficult for farmers to adjust to these issues.

3.4. Strategies to Improve Food Security

The findings indicate that improving agricultural productivity and food security in Northeast Nigeria necessitates a mix of policy and institutional changes. These include increased government investment in agriculture, better rural infrastructure, loan availability, and expanded agricultural extension services. Addressing instability and using climate-smart agricultural techniques are also critical for resuming farming activities and preserving the region's long-term food supply.

4. CONCLUSION

This study examines the importance of agriculture in maintaining food security in Northeast Nigeria and highlighted the major constraints to agricultural productivity in the region. According to the data, agriculture continues to be the principal source of income and food for many households. However, constraints such as restricted access to farming supplies, poor infrastructure, climate variability, and insecurity, particularly from the Boko Haram insurgency, have had a significant impact on agricultural output and food supply.

Despite these hurdles, the study concludes that enhanced government support, better rural infrastructure, climate-resilient farming practices, and effective security measures can boost agricultural output and food security in the region. Addressing these concerns through integrated policies and focused interventions is critical to attaining long-term agricultural growth

and improving the livelihoods of people in Northeast Nigeria.

Recommendations

i) Improve Agricultural Support Systems:

The government should strengthen its support for farmers by providing access to high-yield seed varieties, subsidised fertilisers, efficient irrigation infrastructure, and modern agricultural machinery, with the goal of increasing productivity and overall farm output.

ii) Strengthen Rural Infrastructure Development:

To reduce post-harvest losses and improve food distribution efficiency, further investment in rural road networks, storage and preservation facilities, and improved market access systems is required.

iii) Enhance Agricultural Extension Services:

Farmers should be provided with consistent training, technical guidance, and support in adopting modern and climate-resilient agricultural practices to improve productivity and sustainability.

iv) Address Security Challenges: Concerted efforts should be intensified to restore peace and stability in regions affected by insurgency, enabling farmers to safely return to their farmlands and resume agricultural activities.

v) Expand Access to Agricultural Credit:

Government bodies and financial institutions should facilitate the provision of affordable and accessible credit to smallholder farmers to boost agricultural production and strengthen food security.

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